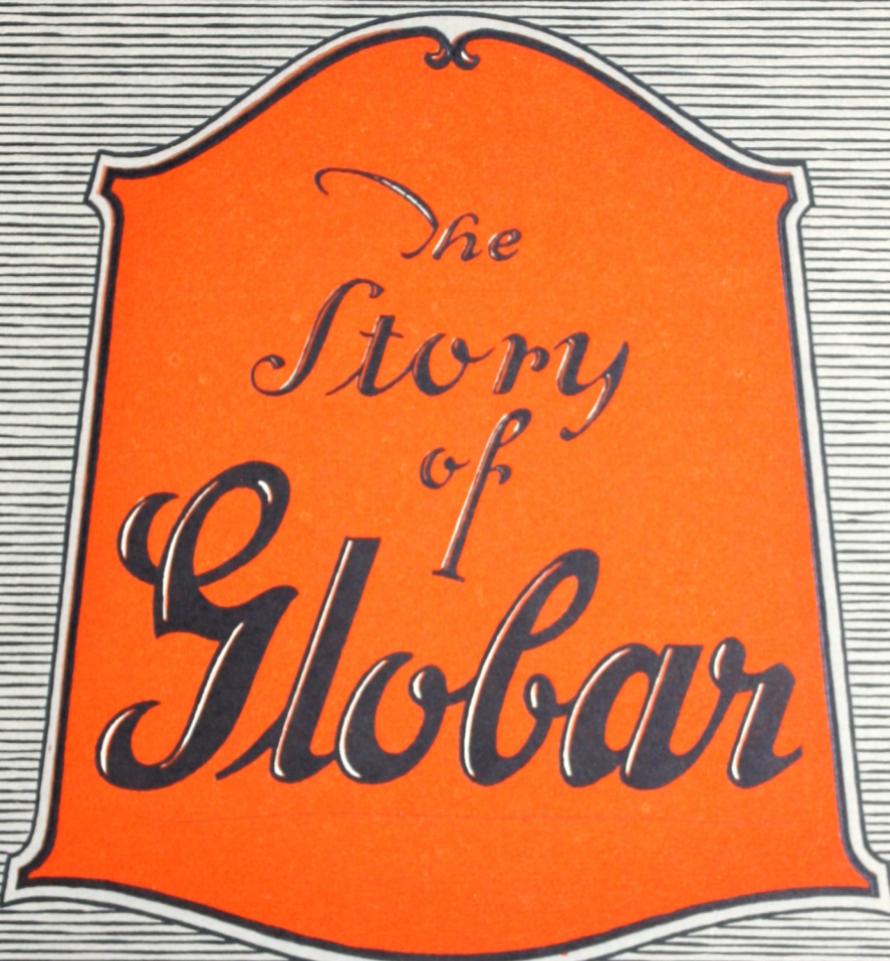



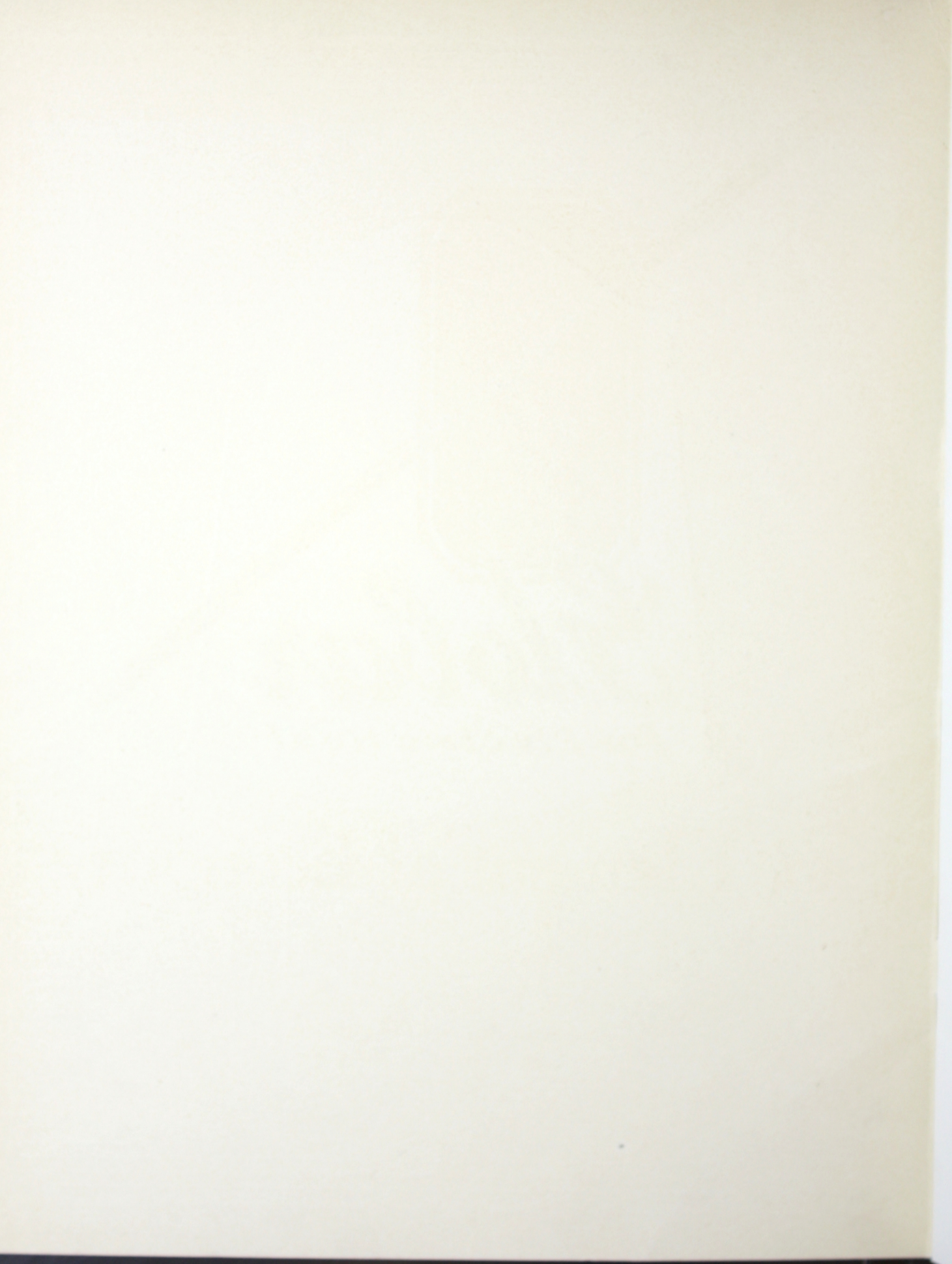
140-10.



*The  
Story  
of  
Global*



American Resistor Corporation  
New York · Philadelphia · Milwaukee  
· U · S · A ·





# *Glo-bar*

*for Electric Heat*

## *The Element of Economy*

American Resistor Corporation  
New York - Philadelphia - Milwaukee  
· U · S · A ·

# What is Globar?

**Globar** is the trade name of products of the American Resistor Corporation. These products include non-metallic resistance elements for producing electrical heat. Such heating elements are usually manufactured in round rod shape. The material of these heating elements resembles in appearance the compound commercially known as silicon carbide.

**Globar** heating elements are the result of many years of scientific research and experiment. They have been thoroughly tested in actual Industrial and Domestic applications in this country as well as abroad.

**Globar** heating elements are manufactured to rigid specifications under the most exacting production conditions. Our Laboratories constantly check production, insuring a product of uniformity.

**Globar** heating elements are produced in numerous standard lengths and diameters and to various Watt capacities. However, the greater portions of **Globar** heating products are made up in specific sizes and ratings to meet the exact requirements of the purchaser. Best results are always secured through the use of **Globar**

heating elements manufactured especially  
to meet the specific requirements  
of each application.

**Does Not  
Decompose  
under 3300°F-  
1820°C**

10-40-51081-11E

# Global Characteristics

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**Global** heating elements have a working temperature up to 2750° F. (1500° C.), this range can be extended to 3000° F. (1640° C.), but only for short periods of time.

The co-efficient of expansion of **Global** heating elements is extremely low, being about one-half that of iron. Rapid heating or quick cooling has no effect on the structure of the element.

The resistance of **Global** heating elements remains practically constant at temperatures above 900° F. (485° C.).

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The only variable characteristic of the **Global** heating element is its change in resistance through use, but this can be made negligible, or entirely compensated for by correct design of the heating apparatus and selection of the proper **Global** heating element.

**Global** heating elements do not scale or burn at temperatures below 3300° F. (1820° C.), in fact they retain the appearance of new elements after long use.

**Global** heating elements can be used on standard voltages, inasmuch as they are manufactured within a wide range of specific resistances.

**Global** heating elements range in size from 3 inches to 60 inches in length, and from 1/4 inch to 1 inch in diameter.

**Global** heating elements quickly attain working temperature and withstand reasonable overloads.

The terminal portion or the ends of **Global** heating elements are specially treated for the purpose of increasing the conductivity thereof, so that a minimum of heat is produced at the contact ends. These are commonly referred to as "cold ends".

**Global** heating elements have greater radiation efficiency and dissipate a greater Watt capacity in a given space.

**Global** heating elements are unaffected by most liquids or gases.

**Global** heating elements do not decompose under 3300° F. (1820° C.) thereby insuring against "burn-outs".

**Global** heating elements are mechanically strong and rigid even at high temperatures.

**Global** heating elements must be manufactured to suit each specific application.

# *Why* Globalbar answers the demand

*Because:-* It is the only electric heating element by which uniformly distributed temperatures between 2000° F (1100° C) and 2750° F (1500° C) can be maintained commercially.

It is the only electric heating element that positively assures continuous operation of your equipment, because of the ease and simplicity by which renewals can be made.

Its characteristics permit simplicity in design, economy in construction of equipment, and lower maintenance costs.

It is the only electric heating element in which both high and low resistances are blended together within the same bar, making possible the "cold end" feature.

**It's a  
Non-Metallic  
Element**



# Mountings

Special terminals have been designed to mount **Global** heating elements at any angle, to meet any operating condition, with assurance of satisfactory performance.

Many new applications of electric heat are being developed with **Global** heating elements because of the ease with which they can be mounted. Mounting problems are simplified through the larger Watt input which can be obtained in a relatively small element.

Special mountings for both high and low temperature furnace work have been developed by us, making possible the replacement of **Global** heating elements while the furnace is in operation—a distinctive and valuable feature which eliminates “shut-downs” entirely.

Mountings for **Global** heating elements have been designed which make possible the replacement of these elements by a novice. Engineering developments for the application of **Global** heating elements are available to all manufacturers using heating elements.

The life of **Global** heating elements reduces replacements to a point of economy, but when replacement is necessary, it can be made as easily as inserting a cartridge fuse in an electric circuit.

Horizontal  
Vertical  
Axial

# Terminals

THE "Cold Ends" on **Globar** heating elements, due to their low resistance, prevent overheating at the contact between the **Globar** heating element and the metallic terminal. It is desirable to use the following type of metallic terminals in order to obtain reliable and efficient operation with **Globar** heating elements.

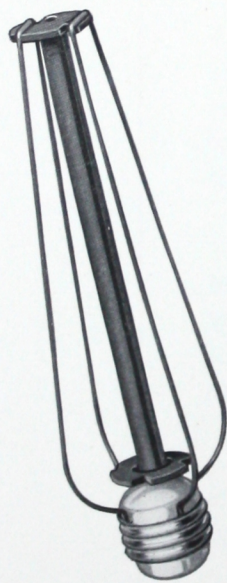
(a) **Domestic** : The so-called "Butt End Terminal" consisting of a flat spring made of hard Monel strip, the contact portion of which is faced with sheet Aluminum as shown in illustration No. 4. The pressure applied by the Monel spring on the cold end of the **Globar** heating element will depend upon its size and will vary between 10 lbs. minimum and 30 lbs. maximum.

**Globar** heating elements may be replaced in low temperature mountings as readily as a common cartridge fuse.

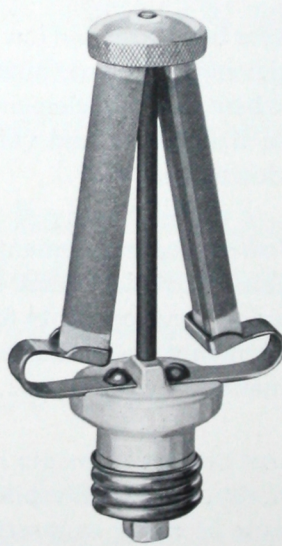
(b) **Industrial** : For low temperature ovens and furnace types having thin sidewalls, the terminal shown in illustration No. 4 is applicable. For high temperature furnaces which are built with thick walls, a chromium steel rod is used intermediate the end of the heating element and the Monel spring, this rod extending through the furnace wall to the Monel spring mounted on the outside of the furnace, as shown in sectional view illustrations on page No. 7. This is necessary in order that the terminals may be kept at low temperature to prevent annealing.

The replacement of a **Globar** heating element in a furnace can be made in less than five minutes insuring such a negligible heat loss as to preclude the possibility of interference with production which makes certain the continuous operation of the furnace.

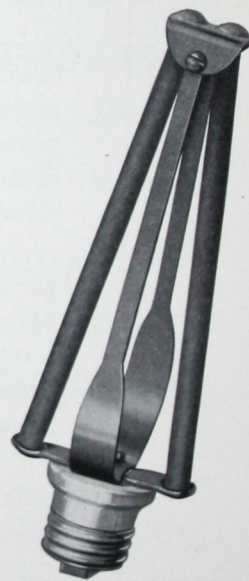
(Patents pending on all terminals shown.)



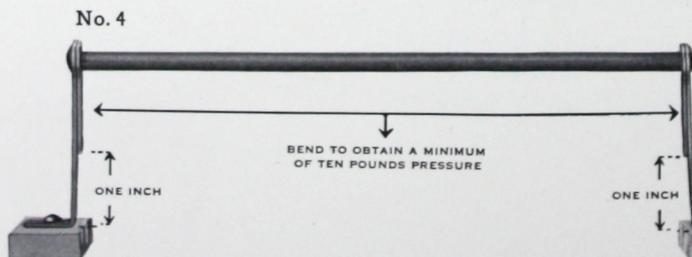
No. 1



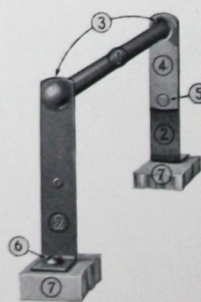
No. 2



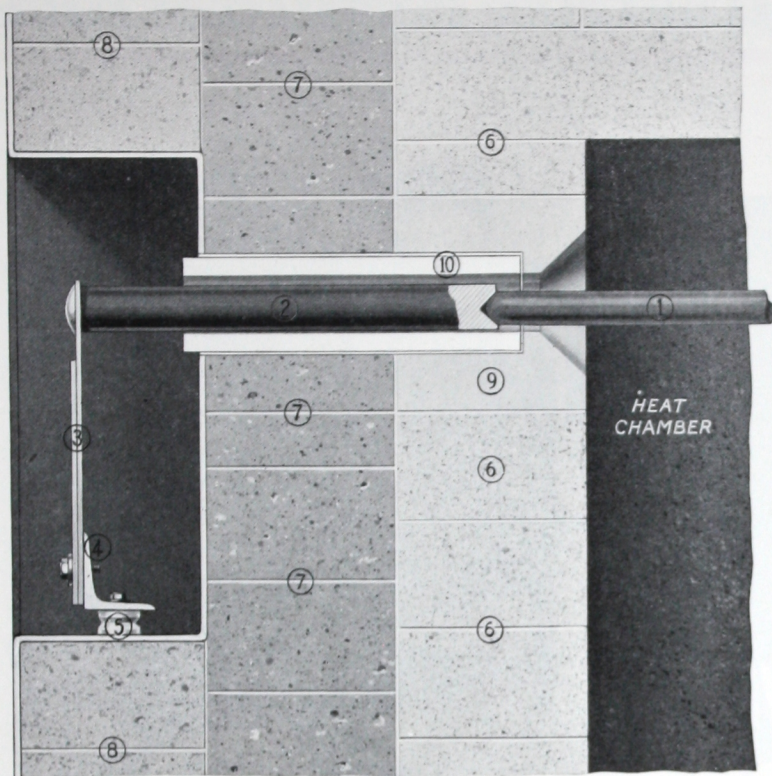
No. 3



Low Temperature Butt-End Terminal Arrangement.



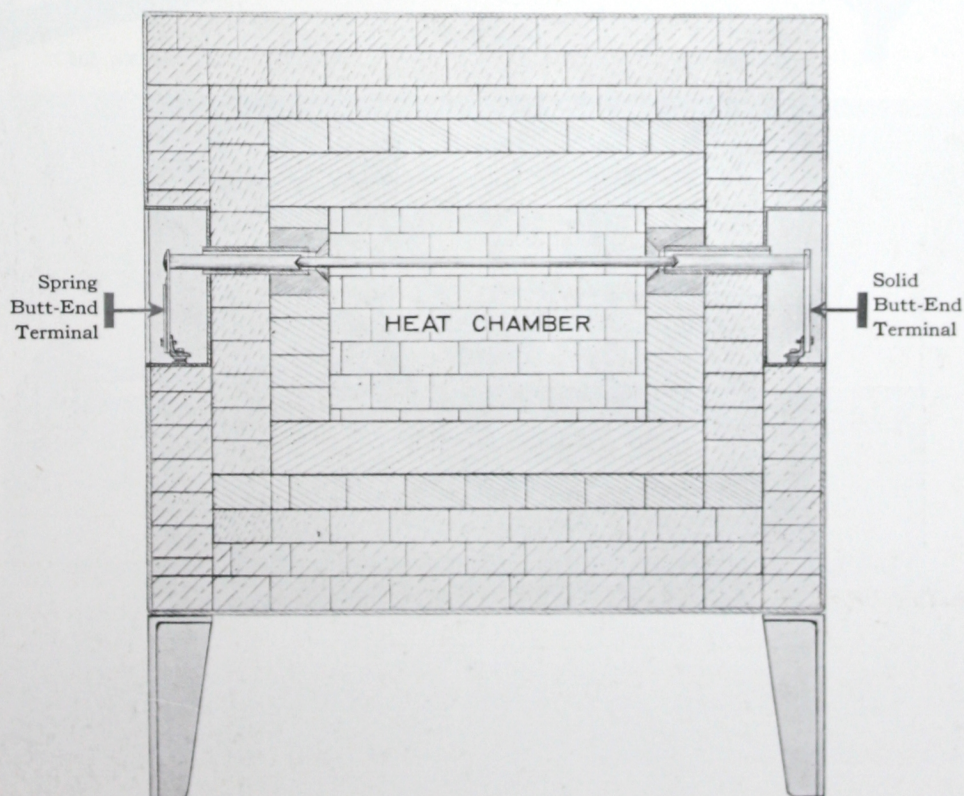
- 1 Globar Heating Element.
- 2 Hard Monel Metal Strip.
- 3 Socket  $\frac{1}{8}$ " deep.
- 4 Aluminum Strip Facing.
- 5 Rivet.
- 6 Insulated Bolt.
- 7 Frame of Apparatus.



## Cross Sectional Views

Showing High Temperature  
"Butt End" Terminal  
Arrangement.

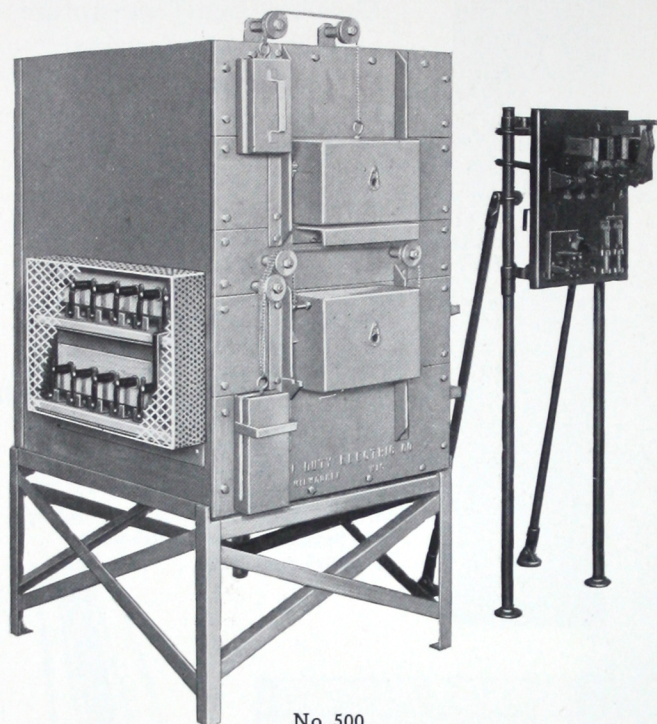
- 1—Global Heating Element.
- 2—Chromium Steel Connecting Rod.
- 3—Monel Spring Butt End Terminal.
- 4—Angle Iron Connected to Supply Line.
- 5—Insulator.
- 6—Refractory Brick.
- 7—Insulation.
- 8—Red Brick.
- 9—Special Shaped Refractory.
- 10—Alundum Tube.



Patents pending on all terminals shown

# Global Industrial Applications

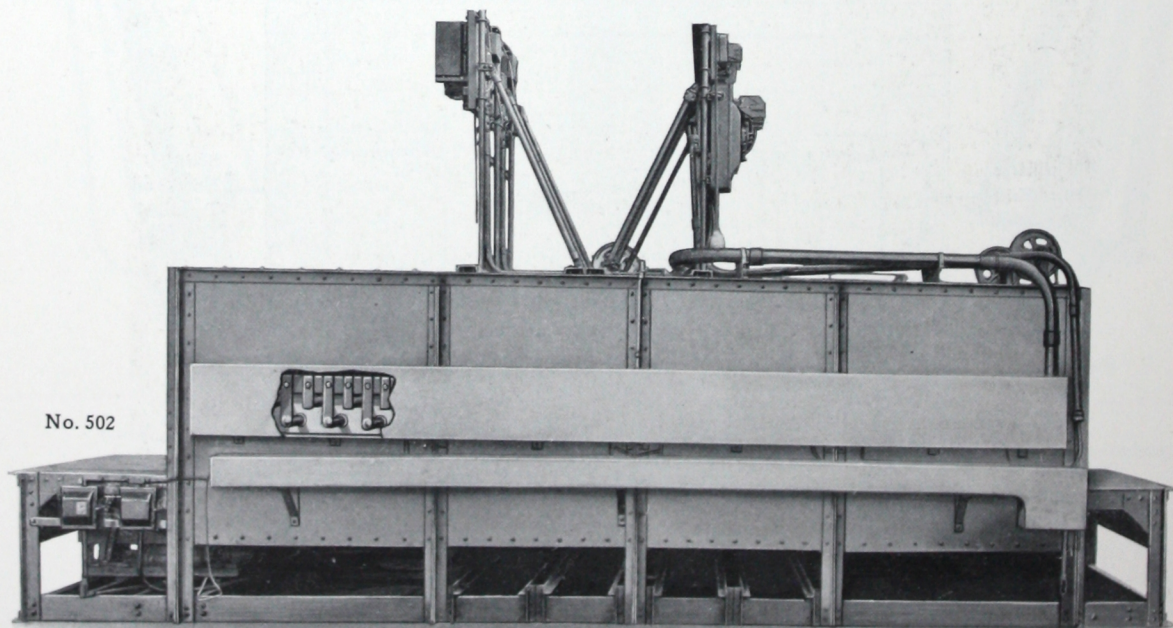
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No. 500



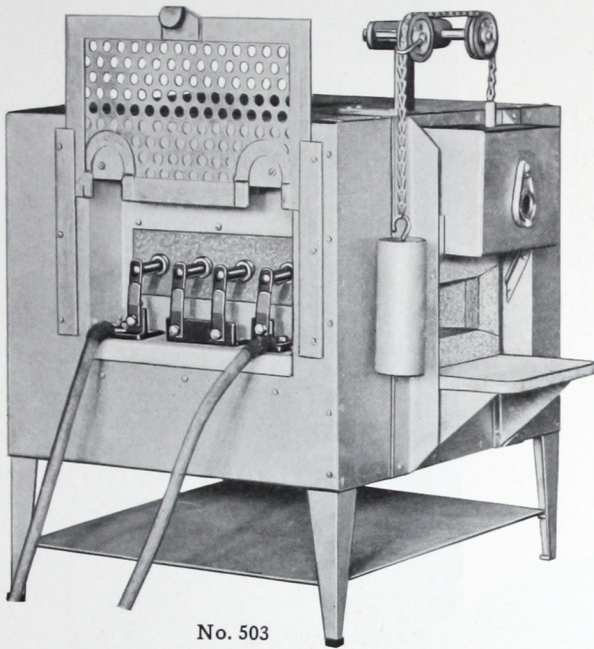
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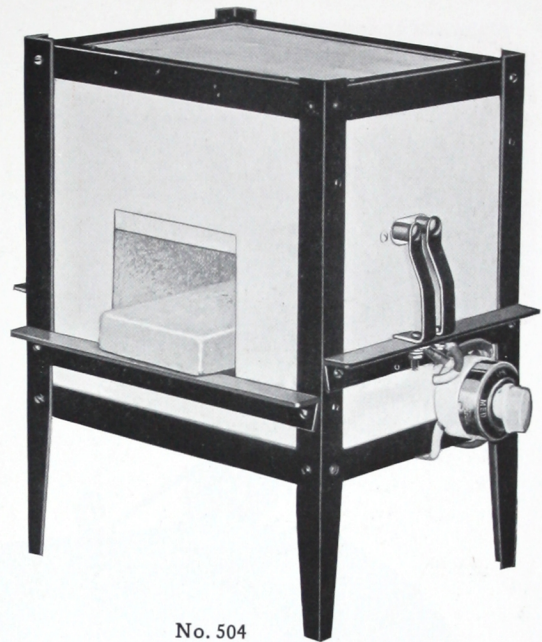
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# Global Industrial Applications

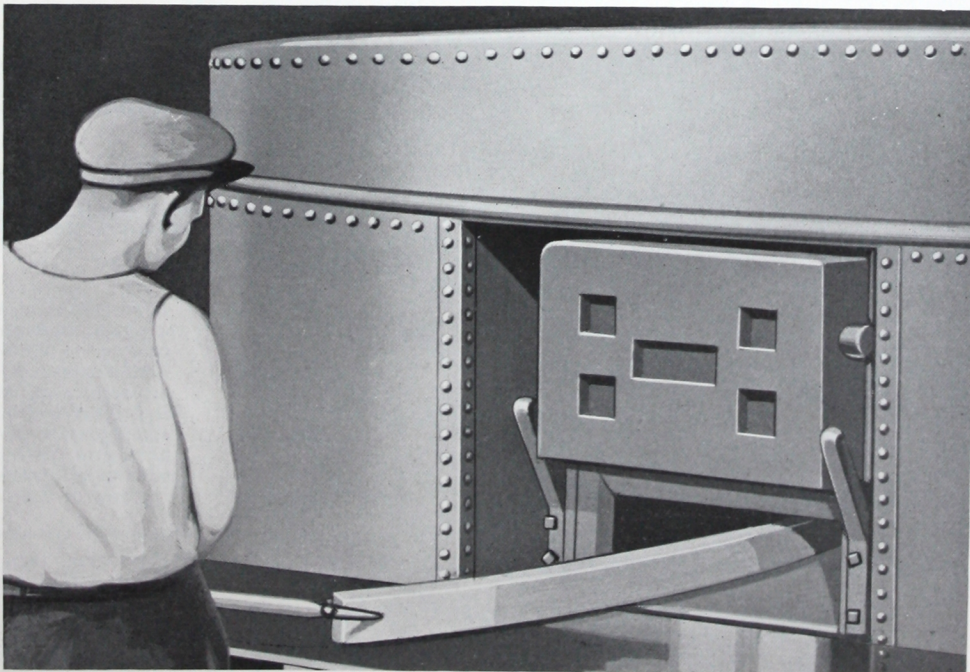
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No. 503



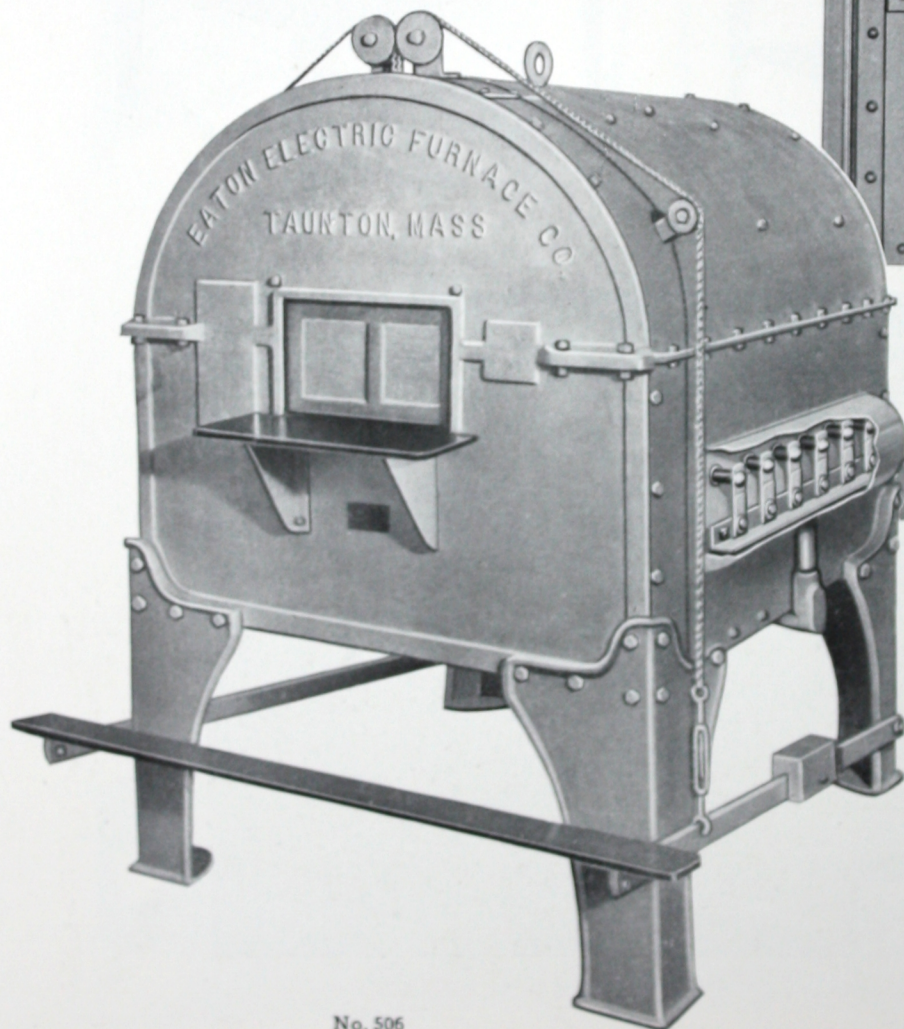
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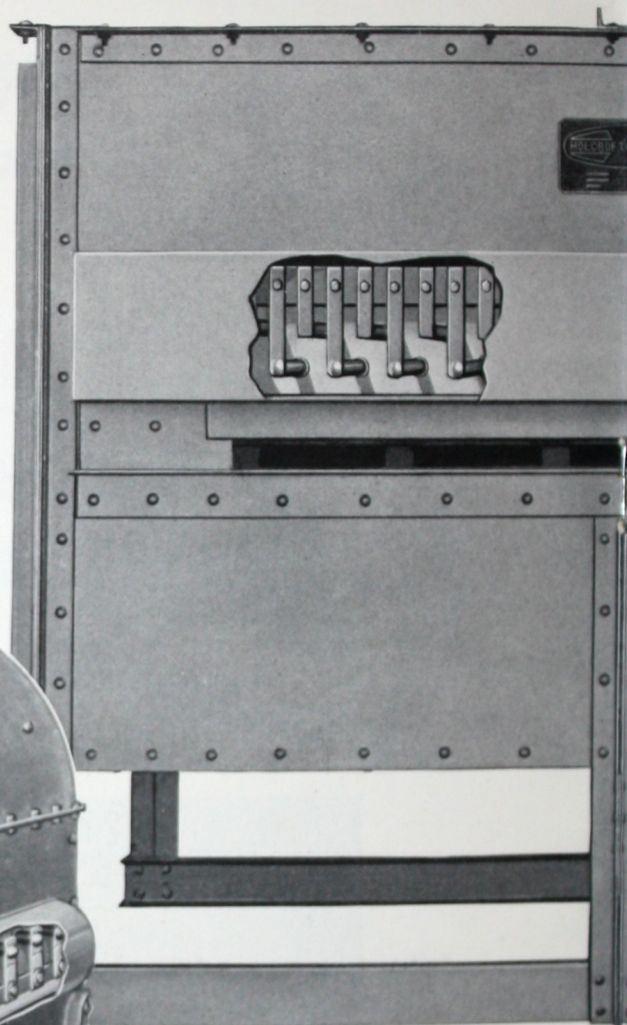
No. 505

# Globar Industries

**Globar**  
for  
ELECTRIC HEAT



No. 506



No. 507

*Globar* heating elements are particularly adapted for high temperatures. *Globar* heating elements will operate up to 2750 degrees F. (1500 degrees C.). They are economical in operation, especially where very high temperatures and other heating apparatus are being displaced on an economical basis, due in part to the unusual life of the units and the high temperatures possible. *Globar* is suitable at all times. Certain applications require the features of the *Globar* element.

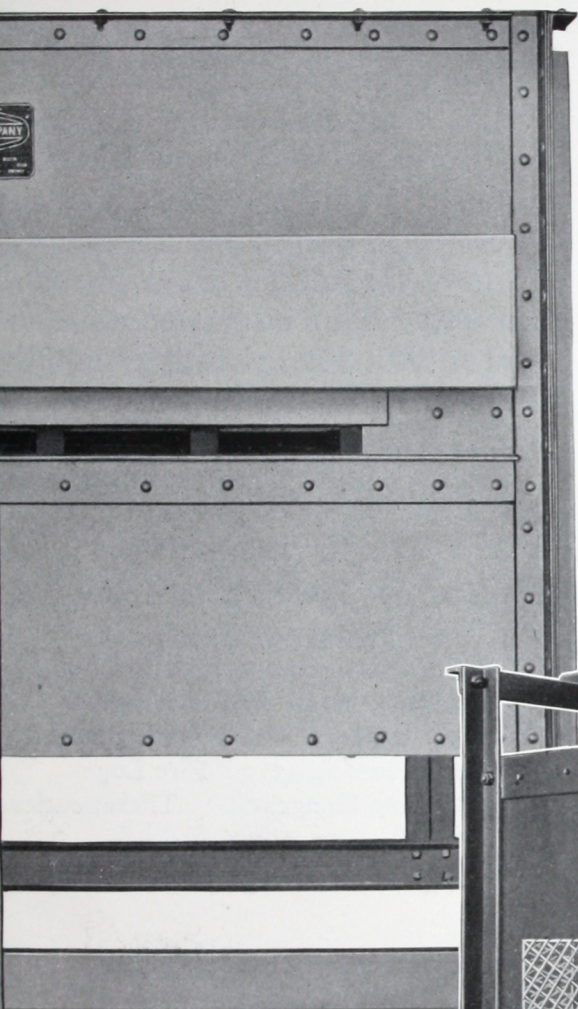
A few of the uses to which the *Globar* heating elements are put are:  
Hardening, tempering, case-hardening, carburizing, annealing, and drawing of steel.

Pot furnaces for lead, cyanide, saltbaths.  
Heat treatment of high-speed steel.

Melting, refining and annealing of metals.  
Forging, billet and rivet heating.

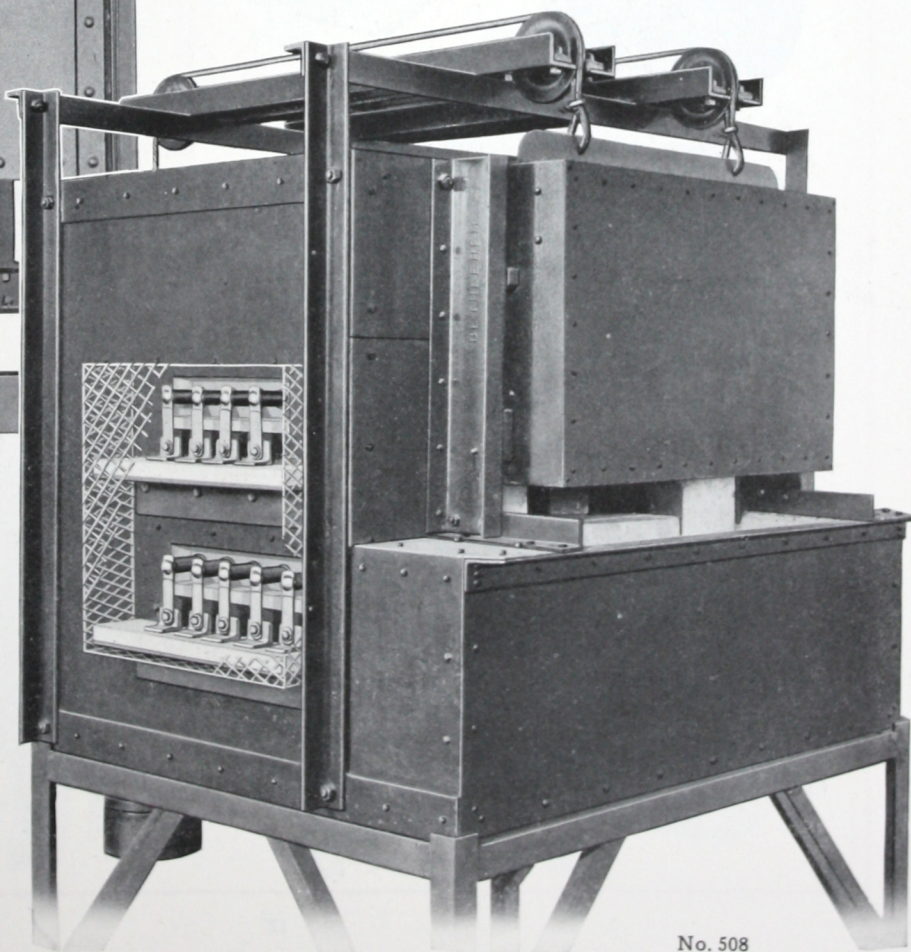
Wire drawing.

# al Applications



ptable by virtue of their high operat-  
operate successfully at any tempera-  
(.). They do not decompose under  
r elements are increasing efficiency  
temperatures are concerned. Furnaces  
igned and operated on a much more  
simplicity of mounting the heating  
accurate temperature control is pos-  
re clean heat, and this is one of the

ating element can be applied, are:  
alvanizing.  
igh temperature laboratory furnaces.  
ental furnaces.  
assay furnaces.  
itreous enameling.  
lass melting, heating and annealing.  
orcelain baking.  
hina firing.



No. 508

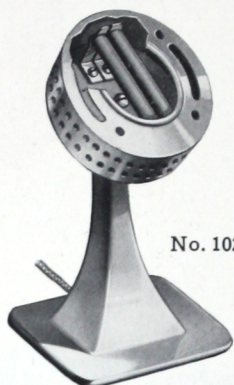
# Globar Domestic and



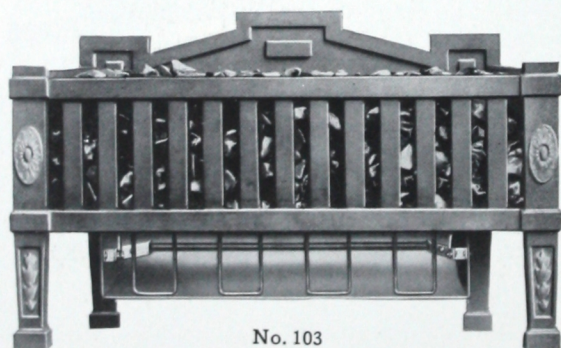
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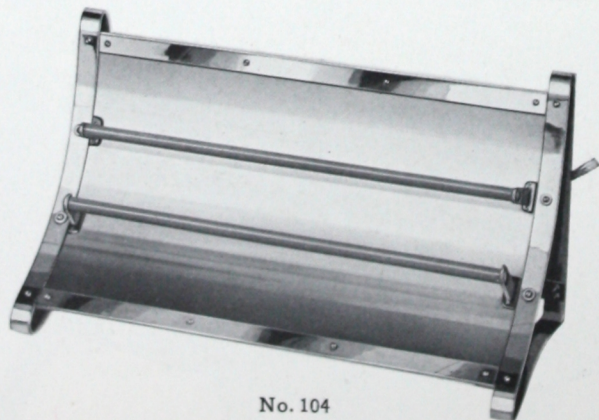
No. 101



No. 102



No. 103



No. 104

The **Globar** heating element has made possible decided improvements in the design of heating appliances because of its many mounting advantages. Its use permits the taking of liberties in design and the removal of many limitations in connection therewith. This makes possible apparatus with better heating qualities and more attractive appearance.

## Domestic Applications

in which

**Globar** Heating Elements  
Are Now Used

Wall Heaters

Water Heaters

Portable Heaters

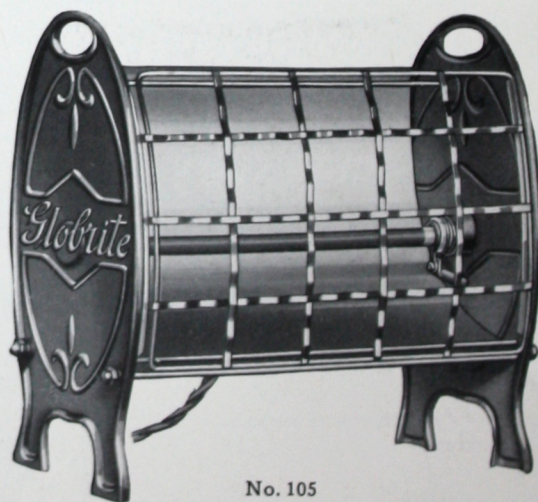
Cigar Lighters

Fireplaces

Fire Logs

Cooking Ranges

Therapeutics



No. 105

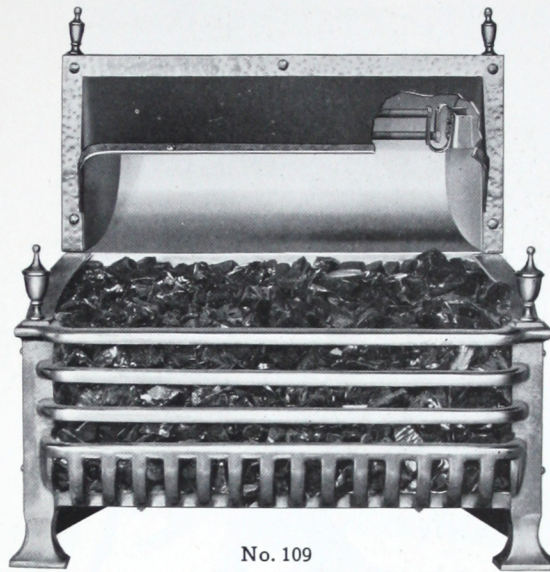
# Miscellaneous Appliances

## Miscellaneous Applications

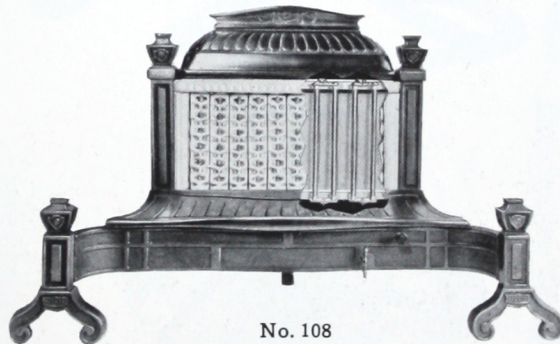
in which

**Globar** Heating Elements  
Are Now Used.

Cold Dryers	Matrix Dryers
Oil Heaters	Singeing
Core Ovens	Tool Treating
Case Hardening	Kilns
Paper Dryers	Sterilizers
Baking Ovens	Branding Irons
Incinerators	Crematory
Air Heaters	Bath Cabinets
Hot Plates	Ink Dryers
Ladle Heaters	Glue Pots
Drying and Baking Abrasive Wheels	
Box Toe Heaters (Shoe Industry)	
Tin and other Metal Baths	
Artificial Teeth Glazers	
Acid Baths and many other	
Chemical Processes	



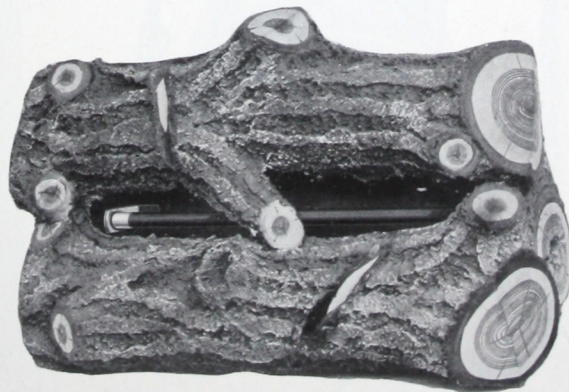
No. 109



No. 108



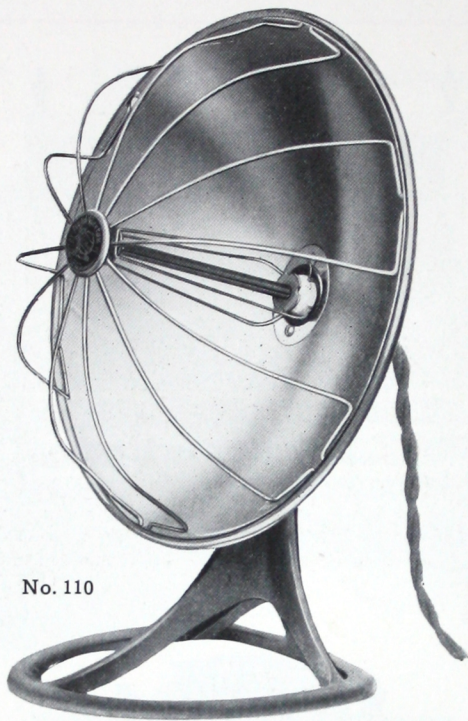
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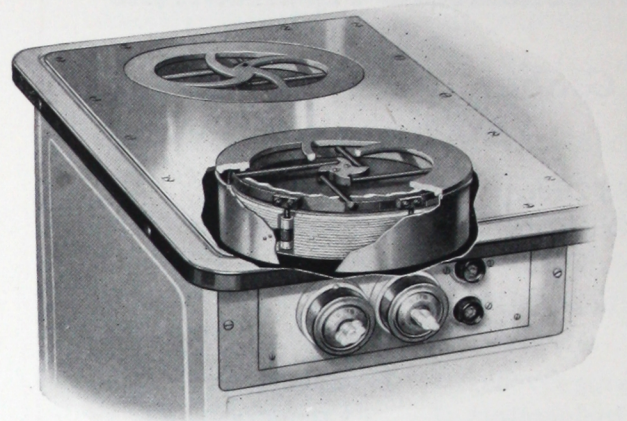
No. 107

# Globar Domestic and

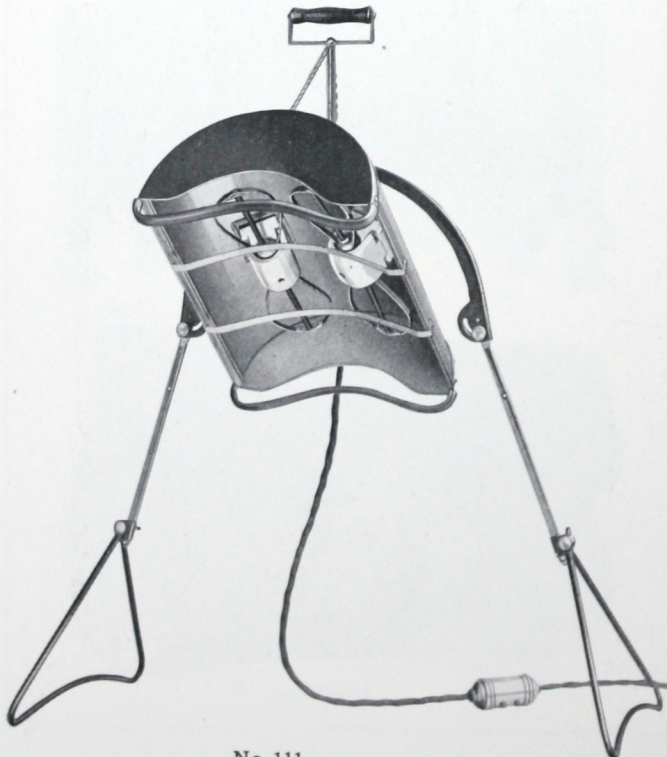
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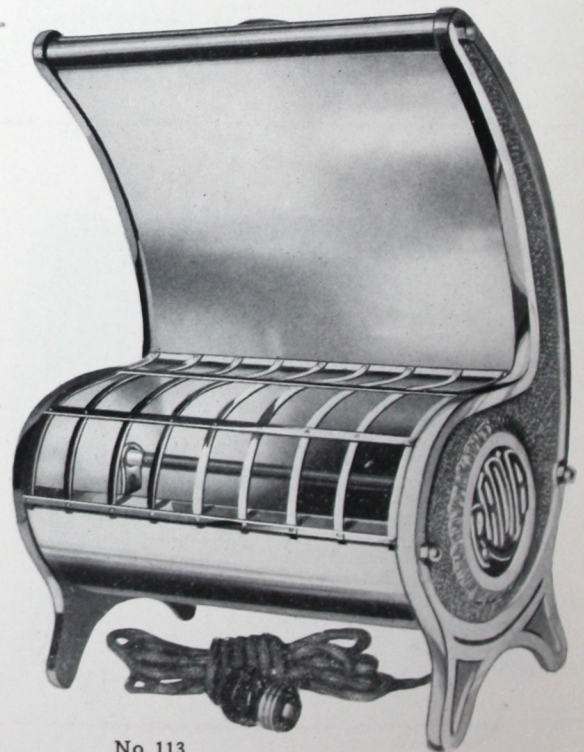
No. 110



No. 112

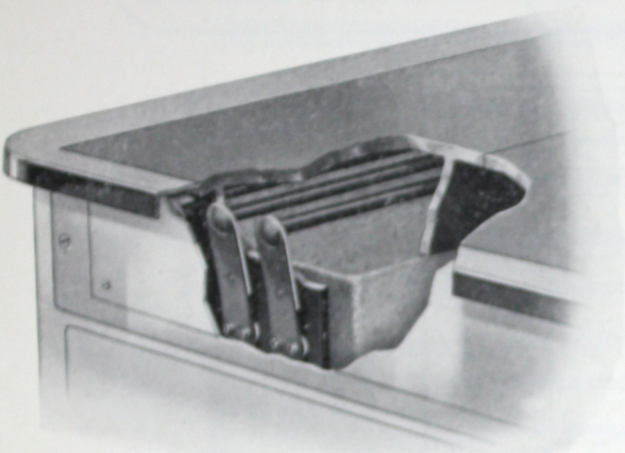


No. 111

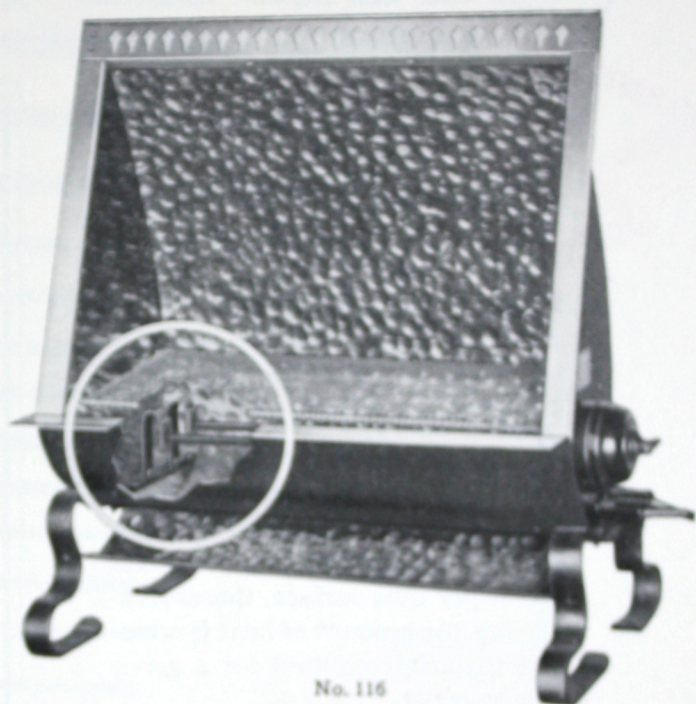


No. 113

# Miscellaneous Appliances



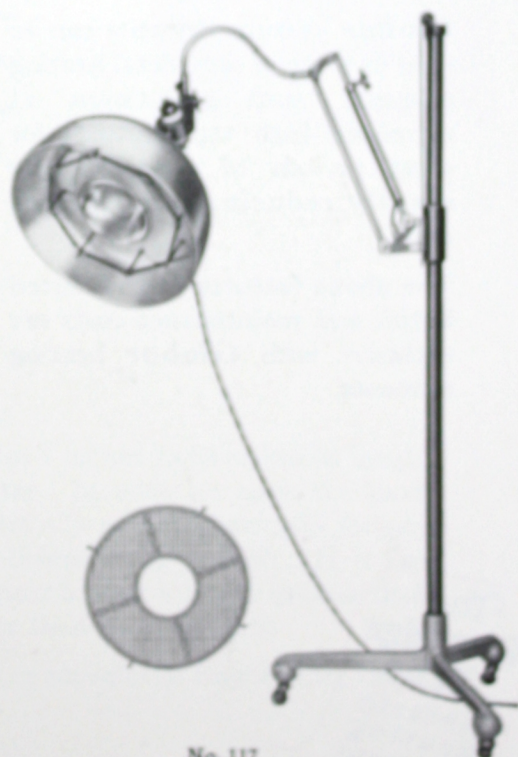
No. 114



No. 116



No. 115



No. 117

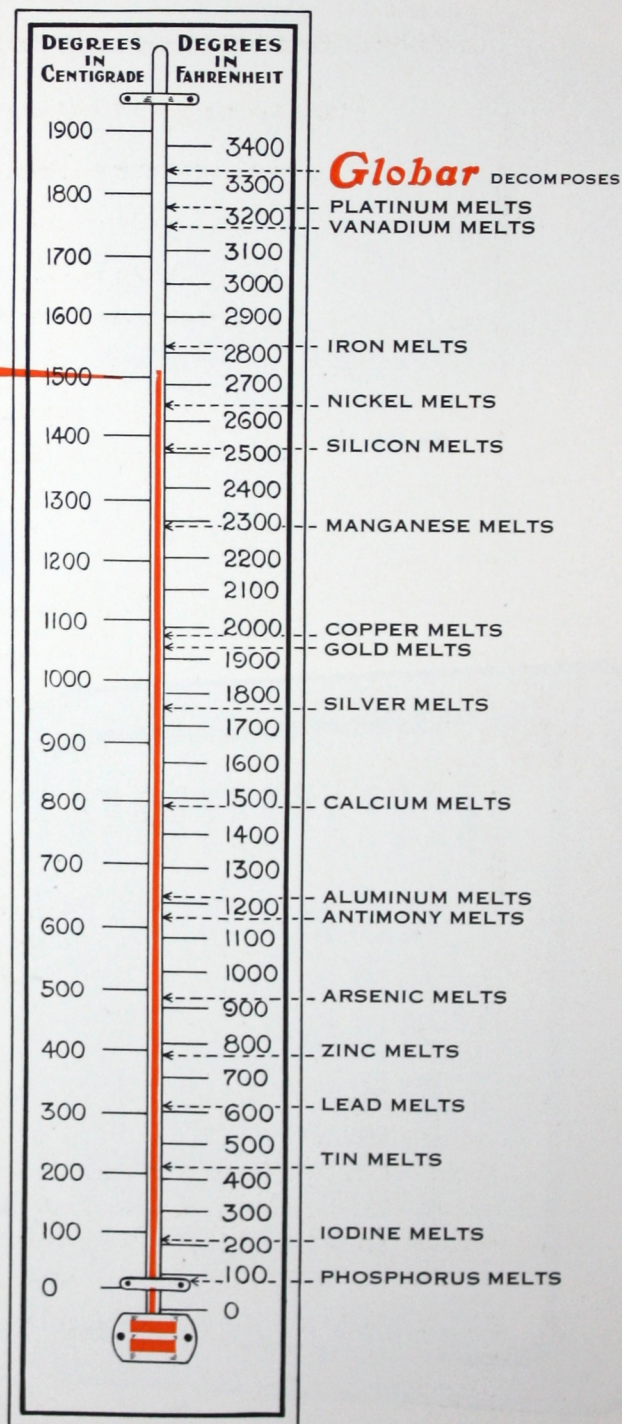
# Globar Operating Temperatures

**T**HE high working temperatures of **Globar** heating elements make practicable the use of electric heat where temperatures above 2000° F (1100° C) are required. This has heretofore been commercially impossible.

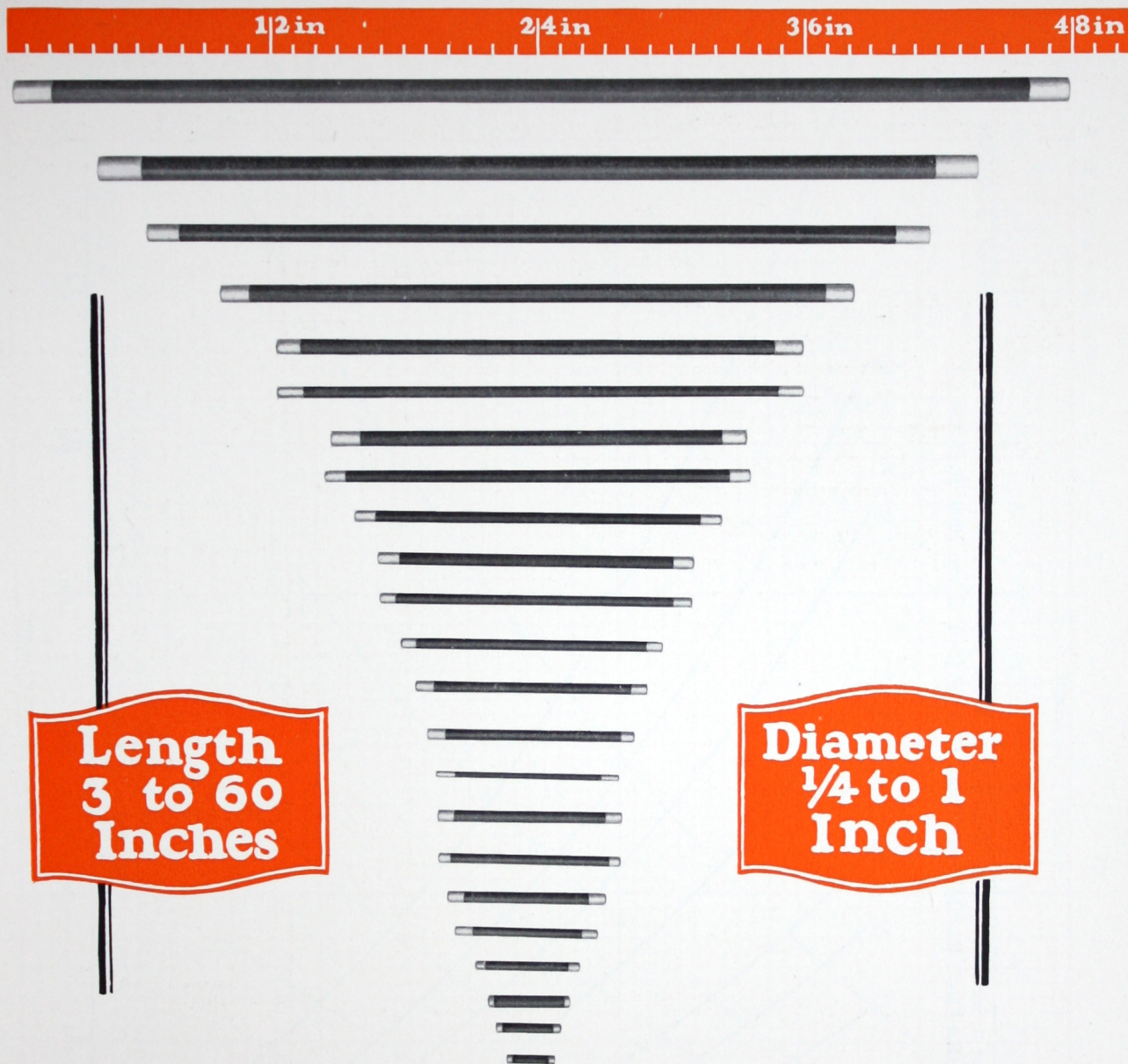
At temperatures below 2000° F (1100° C), decided economies result from the use of **Globar** heating elements, due to the larger Watt input per unit surface, thereby reducing the amount of heat producing material required for a given power input.

**Globar** heating elements can be used in place of rare metal heating elements "such as platinum" at extremely high temperatures for short periods of time, thereby greatly reducing maintenance costs.

The above features as to reduced initial and maintenance costs are exclusive with **Globar** heating elements.



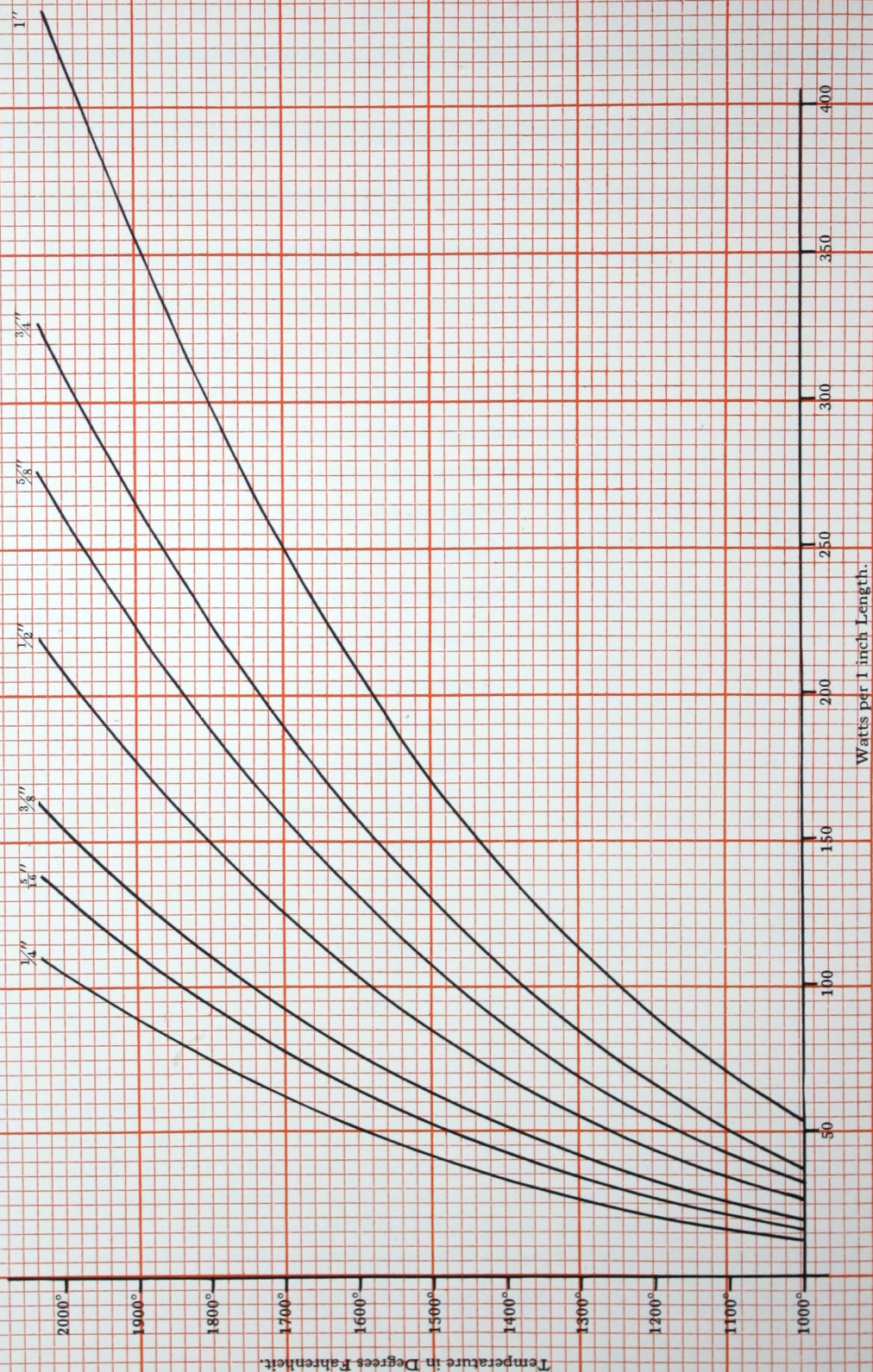
**The  
Cartridge  
Type  
Electric  
Heating  
Element**



**Globar** Heating Elements range in size from 3 inches to 60 inches in length and from  $\frac{1}{4}$  of an inch to 1 inch in diameter. In order to have the most efficient **Globar** heating element both electrically and mechanically for any application it is necessary to use as large a diameter as possible. It is not advisable, however, to specify a **Globar** element having a length greater than fifty times the diameter or a diameter greater than  $\frac{3}{4}$  of an inch.

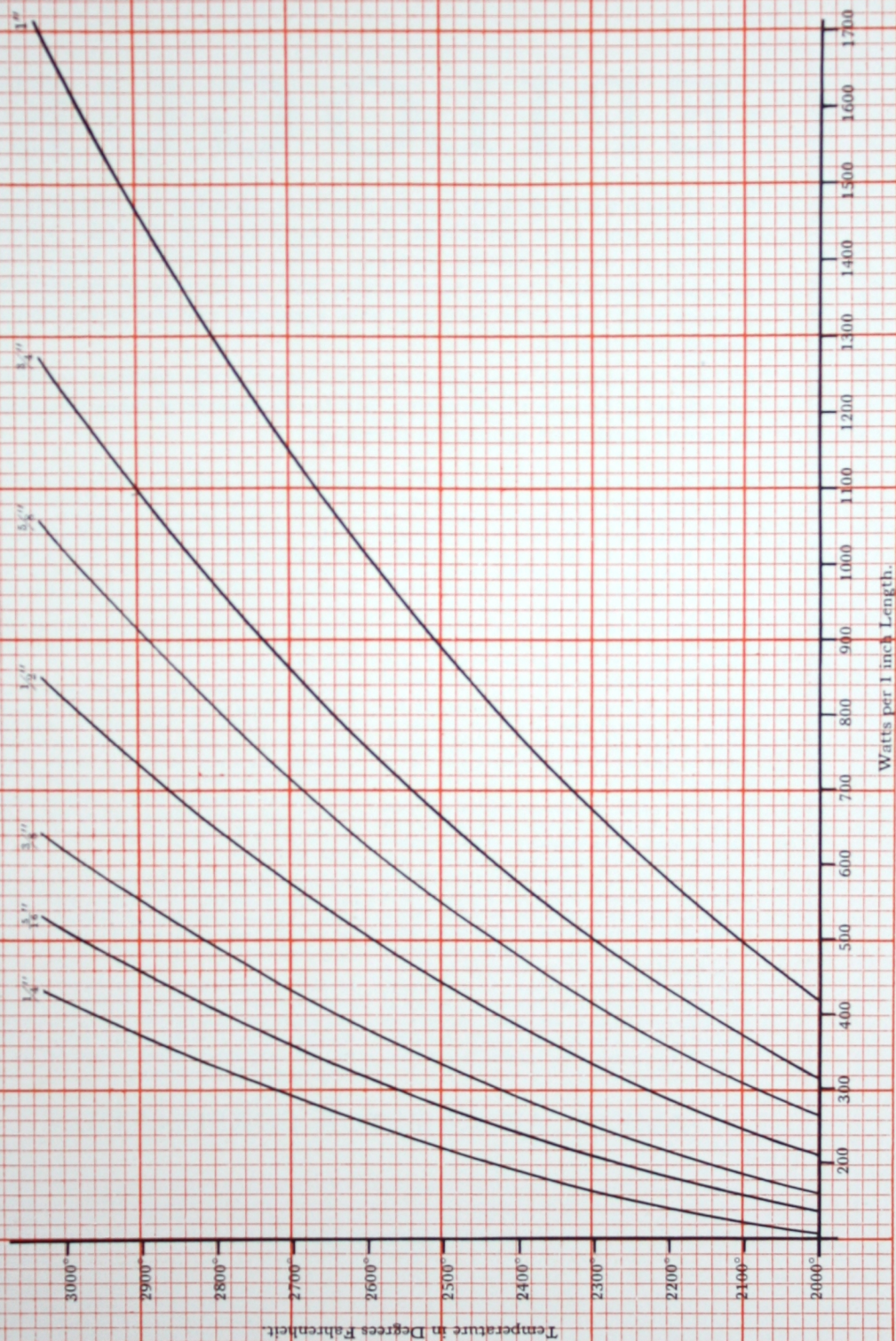
For further details see charts, pages 18 and 19, or consult our Engineering Dept.

Surface Temperature per 1 inch Length in Relation to Watt Input of Various Standard Diameters of GLOBAR  
HEATING ELEMENTS From 1000° F. (540° C.) to 2000° F. (1100° C).



RADIATION TABLE No. 1.

Surface Temperature per 1 inch Length in Relation to Watt Input of Various Standard Diameters of GLOBAR  
HEATING ELEMENTS From 2000° F. (1100° C.) to 3000° F. (1640° C.).



RADIATION TABLE No. 2.

# •EPILOGUE•

We maintain a staff of highly trained Electrical, Chemical and Metallurgical Engineers who have specialized in the application of **Global** heating elements to electric heating problems. This staff and our completely equipped laboratory, are at your service, and we bespeak an opportunity to work with you in the design of your apparatus and the application of heating units thereto.

In order to conserve your time, we have intentionally confined ourselves to a digest of facts in the foregoing, and for the benefit of those interested in further details, we submit the following:

**Global** heating elements do not decrease in size or lose their mechanical strength when subjected to high temperatures, and therefore can be used until the resistance has increased to a considerable extent, while in the case of metallic elements, when the resistance has materially increased, the mechanical strength has been so greatly diminished as to render the elements practically useless. In industrial applications, the life of **Global** heating elements is fixed largely, not by its failure mechanically, but by the limit to which the user cares to go in increasing the voltage applied thereto.

Because of their ability to fully withstand the destructive action of gases and fumes present in certain furnaces and other apparatus, the chemical nature of **Global** heating elements often is of vital importance.

The characteristic of **Global** heating elements, which is of primary importance in connection with electrical work, is its resistance. This resistance is determined by the length and diameter as well as the nature of the material of which the **Global** element is composed. While the resistance of a given piece of metallic alloy can be varied over a limited range by varying the mixture of the alloy and the heat treatment, a **Global** element of given dimensions can be manufactured to have a wide range of resistance values. It is necessary, however, to take into consideration the nature of the application before specifying the type of **Global** element required; for example, low resistance **Global** elements are required in high temperature furnaces.

**Global** heating elements are commonly made up in multiple lengths of 1 inch and multiple diameter of 1/16 of an inch. In order to compare **Global** elements of different current capacities on a common basis, it is necessary to work with a section of material of standard dimensions. For simplicity of calculation, we have decided to compare such material in the form of a unit 1 inch long and 1/16 inch in diameter, and the resistance of this unit will be considered as the **Global** Unit Resistance.

Since we can manufacture **Global** products having a wide range of unit resistance, we have established an engineering laboratory to determine what type of material, or in other words, what unit resistance is most satisfactory for the various applications our customers are interested in. We have records of tests on **Global** elements having a wide range of unit resistance, so we can quickly specify the unit resistance best suited for any given application.

The lowest **Global** Unit Resistance is 9 ohms and the highest, practical for heating work, is 90 ohms. The unit resistance of **Global** resistors can be run as high as one million ohms when they carry only very small currents.

**Global** heating elements have a negative temperature co-efficient of resistance at temperatures below 900 F. (485 C.), but this co-efficient becomes slightly positive at higher temperatures, so that for heating purposes **Global** elements are as stable as any metallic element.

## AMERICAN RESISTOR CORPORATION



# DECLARATION

I, the undersigned, do hereby declare that the foregoing is a true and correct copy of the original as the same appears in the records of the Court.

Witness my hand and seal this 1st day of January, 1901.

CLERK OF THE COURT.

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_

By \_\_\_\_\_

